

NL27WZ06

Dual Inverter with Open Drain Outputs

The NL27WZ06 is a high performance dual inverter with open drain outputs operating from a 1.65 V to 5.5 V supply.

The internal circuit is composed of multiple stages, including an open drain output which provides the capability to set output switching level. This allows the NL27WZ06 to be used to interface 5.0 V circuits to circuits of any voltage between V_{CC} and 7.0 V using an external resistor and power supply.

- Extremely High Speed: t_{PD} 2.4 ns (typical) at $V_{CC} = 5.0$ V
- Designed for 1.65 V to 5.5 V V_{CC} Operation
- Over Voltage Tolerant Inputs
- LVTTTL Compatible – Interface Capability With 5.0 V TTL Logic with $V_{CC} = 3.0$ V
- LVC MOS Compatible
- 24 mA Output Sink Capability
- Near Zero Static Supply Current Substantially Reduces System Power Requirements
- Chip Complexity: FET = 72; Equivalent Gate = 18
- Pb-Free Package is Available

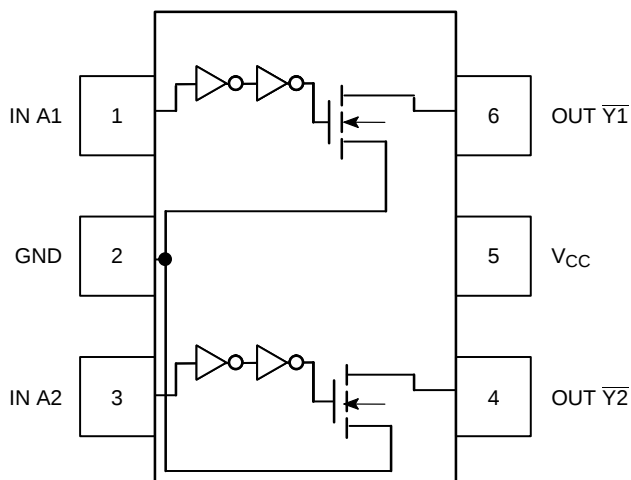


Figure 1. Pinout (Top View)

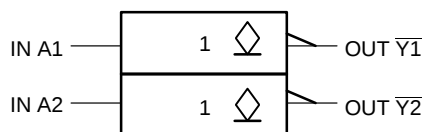


Figure 2. Logic Symbol



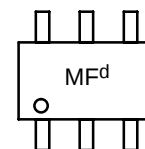
ON Semiconductor®

<http://onsemi.com>

MARKING DIAGRAMS



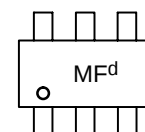
SC-88
DF SUFFIX
CASE 419B



Pin 1
d = Date Code



TSOP-6
DT SUFFIX
CASE 318G



Pin 1
d = Date Code

PIN ASSIGNMENT

1	IN A1
2	GND
3	IN A2
4	OUT $\bar{Y}2$
5	V_{CC}
6	OUT $\bar{Y}1$

FUNCTION TABLE

A Input	$\bar{Y}$ Output
L	Z
H	L

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

MAXIMUM RATINGS

Symbol	Characteristics	Value	Unit
V_{CC}	DC Supply Voltage	-0.5 to +7.0	V
V_I	DC Input Voltage	$-0.5 \leq V_I \leq +7.0$	V
V_O	DC Output Voltage Output in Z or LOW State (Note 1)	$-0.5 \leq V_O \leq 7.0$	V
I_{IK}	DC Input Diode Current $V_I < GND$	-50	mA
I_{OK}	DC Output Diode Current $V_O < GND$	-50	mA
I_O	DC Output Sink Current	± 50	mA
I_{CC}	DC Supply Current Per Supply Pin	± 100	mA
I_{GND}	DC Ground Current Per Ground Pin	± 100	mA
T_{STG}	Storage Temperature Range	-65 to +150	°C
P_D	Power Dissipation in Still Air SC-88, TSOP-6	200	mW
θ_{JA}	Thermal resistance SC-88, TSOP-6	333	°C/W
T_L	Lead temperature, 1 mm from case for 10 s	260	°C
T_J	Junction temperature under bias	+150	°C
V_{ESD}	ESD Withstand Voltage Human Body Model (Note 2) Machine Model (Note 3) Charged Device Model (Note 4)	> 2000 > 200 N/A	V
$I_{Latch-Up}$	Latch-Up Performance Above V_{CC} and Below GND at 85°C (Note 5)	± 500	mA

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. I_O absolute maximum rating must be observed.
2. Tested to EIA/JESD22-A114-A
3. Tested to EIA/JESD22-A115-A
4. Tested to JESD22-C101-A
5. Tested to EIA/JESD78

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_{CC}	Supply Voltage Operating Data Retention Only	1.65 1.5	5.5 5.5	V
V_I	Input Voltage	0	5.5	V
V_O	Output Voltage (Z or LOW State)	0	5.5	V
T_A	Operating Free-Air Temperature	-55	+125	°C
$\Delta t/\Delta V$	Input Transition Rise or Fall Rate $V_{CC} = 2.5 V \pm 0.2 V$ $V_{CC} = 3.0 V \pm 0.3 V$ $V_{CC} = 5.0 V \pm 0.5 V$	0 0 0	20 10 5	ns/V

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-40°C ≤ T _A ≤ 85°C		Unit
				Min	Typ	Max	Min	Max	
V _{IH}	High-Level Input Voltage		1.65 2.3 to 5.5	0.75 V _{CC} 0.70 V _{CC}			0.75 V _{CC} 0.70 V _{CC}		V
V _{IL}	Low-Level Input Voltage		1.65 2.3 to 5.5			0.25 V _{CC} 0.30 V _{CC}		0.25 V _{CC} 0.30 V _{CC}	V
I _{LKG}	Z-State Output Leakage Current	V _{IN} = V _{IL} V _{OUT} = V _{CC} or GND	1.65 to 5.5			±5.0		±10.0	μA
V _{OL}	Low-Level Output Voltage V _{IN} = V _{IH}	I _{OL} = 100 μA	1.65 to 5.5		0.0	0.1		0.1	V
		I _{OL} = 3 mA	1.65		0.08	0.24			
		I _{OL} = 8 mA	2.3		0.22	0.3		0.3	
		I _{OL} = 12 mA	2.7		0.22	0.4		0.4	
		I _{OL} = 16 mA	3.0		0.28	0.4		0.4	
		I _{OL} = 24 mA	3.0		0.38	0.55		0.55	
		I _{OL} = 32 mA	4.5		0.42	0.55		0.55	
I _{IN}	Input Leakage Current	V _{IN} or V _{OUT} = V _{CC} or GND	0 to 5.5			±0.1		±1.0	μA
I _{OFF}	Power Off-Output Leakage Current	V _{OUT} = 5.5 V	0			1		10	μA
I _{CC}	Quiescent Supply Current	V _{IN} = V _{CC} or GND	5.5			1		10	μA

AC ELECTRICAL CHARACTERISTICS t_R = t_F = 2.5 ns; C_L = 50 pF; R_L = 500 Ω

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-40°C ≤ T _A ≤ 85°C		Unit
				Min	Typ	Max	Min	Max	
t _{PZL}	Propagation Delay (Figure 3 and 4)	R _L = R ₁ = 5000 Ω, C _L = 15 pF	1.8 ± 0.15	2.0	5.7	10.5	2.0	11.0	ns
		R _L = R ₁ = 500 Ω, C _L = 50 pF	2.5 ± 0.20	0.8	3.0	3.6	0.8	4.1	
		R _L = R ₁ = 500 Ω, C _L = 50 pF	3.3 ± 0.30	0.8	2.4	3.2	0.8	3.7	
		R _L = R ₁ = 500 Ω, C _L = 50 pF	5.0 ± 0.50	0.5	2.4	3.0	0.5	3.5	
t _{PLZ}	Propagation Delay (Figure 3 and 4)	R _L = R ₁ = 5000 Ω, C _L = 15 pF	1.8 ± 0.15	2.0	5.7	10.5	2.0	11.0	ns
		R _L = R ₁ = 500 Ω, C _L = 50 pF	2.5 ± 0.20	0.8	3.0	3.6	0.8	4.1	
		R _L = R ₁ = 500 Ω, C _L = 50 pF	3.3 ± 0.30	0.8	2.1	3.2	0.8	3.7	
		R _L = R ₁ = 500 Ω, C _L = 50 pF	5.0 ± 0.50	0.5	1.2	3.0	0.5	3.5	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C _{IN}	Input Capacitance	V _{CC} = 5.5 V, V _I = 0 V or V _{CC}	2.5	pF
C _{OUT}	Output Capacitance	V _{CC} = 5.5 V, V _I = 0 V or V _{CC}	4	pF
C _{PD}	Power Dissipation Capacitance (Note 6)	10 MHz, V _{CC} = 5.5 V, V _I = 0 V or V _{CC}	4	pF

6. C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: I_{CC(OPR)} = C_{PD} • V_{CC} • f_{in} + I_{CC}. C_{PD} is used to determine the no-load dynamic power consumption; P_D = C_{PD} • V_{CC}² • f_{in} + I_{CC} • V_{CC}.

DC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-55°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
V _{IH}	High-Level Input Voltage		1.65 2.3 to 5.5	0.75 V _{CC} 0.70 V _{CC}			0.75 V _{CC} 0.70 V _{CC}		V
V _{IL}	Low-Level Input Voltage		1.65 2.3 to 5.5			0.25 V _{CC} 0.30 V _{CC}		0.25 V _{CC} 0.30 V _{CC}	V
I _{LKG}	Z-State Output Leakage Current	V _{IN} = V _{IL} V _{OUT} = V _{CC} or GND	1.65 to 5.5			±5.0		±10.0	μA
V _{OL}	Low-Level Output Voltage V _{IN} = V _{IH}	I _{OL} = 100 μA	1.65 to 5.5		0.0	0.1		0.1	V
		I _{OL} = 3 mA	1.65		0.08	0.24			
		I _{OL} = 8 mA	2.3		0.22	0.3		0.35	
		I _{OL} = 12 mA	2.7		0.22	0.4		0.45	
		I _{OL} = 16 mA	3.0		0.28	0.4		0.5	
		I _{OL} = 24 mA	3.0		0.38	0.55		0.65	
		I _{OL} = 32 mA	4.5		0.42	0.55		0.65	
I _{IN}	Input Leakage Current	V _{IN} or V _{OUT} = V _{CC} or GND	0 to 5.5			±0.1		±1.0	μA
I _{OFF}	Power Off-Output Leakage Current	V _{OUT} = 5.5 V	0			1		10	μA
I _{CC}	Quiescent Supply Current	V _{IN} = V _{CC} or GND	5.5			1		10	μA

AC ELECTRICAL CHARACTERISTICS t_R = t_F = 2.5 ns; C_L = 50 pF; R_L = 500 Ω

Symbol	Parameter	Condition	V _{CC} (V)	T _A = 25°C			-55°C ≤ T _A ≤ 125°C		Unit
				Min	Typ	Max	Min	Max	
t _{PZL}	Propagation Delay (Figure 3 and 4)	R _L = R ₁ = 5000 Ω, C _L = 15 pF	1.8 ± 0.15	2.0	5.7	10.5	2.0	11.0	ns
		R _L = R ₁ = 500 Ω, C _L = 50 pF	2.5 ± 0.20	0.8	3.0	3.6	0.8	4.1	
		R _L = R ₁ = 500 Ω, C _L = 50 pF	3.3 ± 0.30	0.8	2.4	3.2	0.8	3.7	
		R _L = R ₁ = 500 Ω, C _L = 50 pF	5.0 ± 0.50	0.5	2.4	3.0	0.5	3.5	
t _{PLZ}	Propagation Delay (Figure 3 and 4)	R _L = R ₁ = 5000 Ω, C _L = 15 pF	1.8 ± 0.15	2.0	5.7	10.5	2.0	11.0	ns
		R _L = R ₁ = 500 Ω, C _L = 50 pF	2.5 ± 0.20	0.8	3.8	4.5	0.8	5.0	
		R _L = R ₁ = 500 Ω, C _L = 50 pF	3.3 ± 0.30	0.8	2.9	3.2	0.8	3.7	
		R _L = R ₁ = 500 Ω, C _L = 50 pF	5.0 ± 0.50	0.5	1.2	3.0	0.5	3.5	

CAPACITIVE CHARACTERISTICS

Symbol	Parameter	Condition	Typical	Unit
C _{IN}	Input Capacitance	V _{CC} = 5.5 V, V _I = 0 V or V _{CC}	2.5	pF
C _{OUT}	Output Capacitance	V _{CC} = 5.5 V, V _I = 0 V or V _{CC}	4	pF
C _{PD}	Power Dissipation Capacitance (Note 6)	10 MHz, V _{CC} = 5.5 V, V _I = 0 V or V _{CC}	4	pF

7. C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load. Average operating current can be obtained by the equation: I_{CC(OPR)} = C_{PD} • V_{CC} • f_{in} + I_{CC}. C_{PD} is used to determine the no-load dynamic power consumption; P_D = C_{PD} • V_{CC}² • f_{in} + I_{CC} • V_{CC}.

NL27WZ06

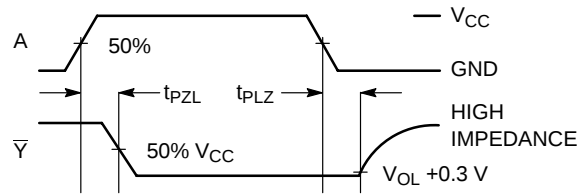


Figure 3. Switching Waveforms

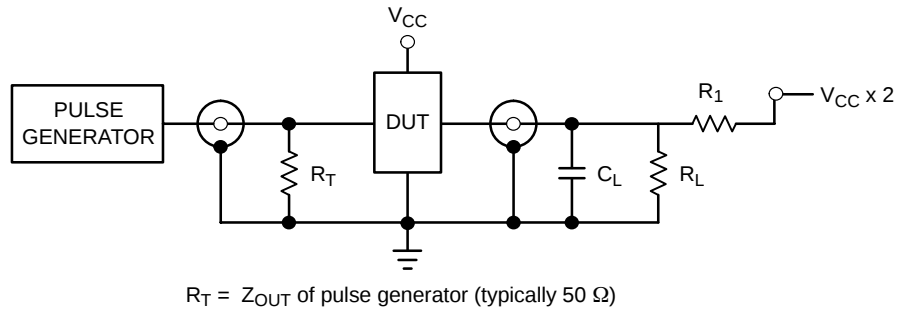


Figure 4. Test Circuit

ORDERING INFORMATION

Device	Device Nomenclature							Package	Shipping [†]
	Logic Circuit Indicator	No. of Gates per Package	Temp Range Identifier	Technology	Device Function	Package Suffix	Tape & Reel Suffix [†]		
NL27WZ06DFT2	NL	2	7	WZ	06	DF	T2	SC-88	3000 / Tape & Reel
NL27WZ06DFT2G	NL	2	7	WZ	06	DF	T2	SC-88 (Pb-Free)	3000 / Tape & Reel
NL27WZ06DTT1	NL	2	7	WZ	06	DT	T1	TSOP-6	3000 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

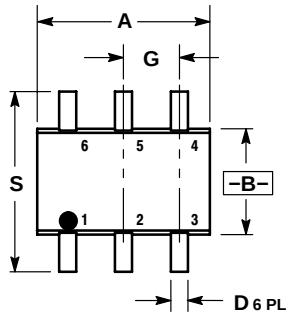
NL27WZ06

PACKAGE DIMENSIONS

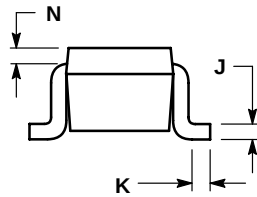
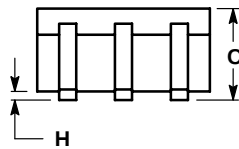
SC-88/SC70-6/SOT-363
CASE 419B-02
ISSUE U

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

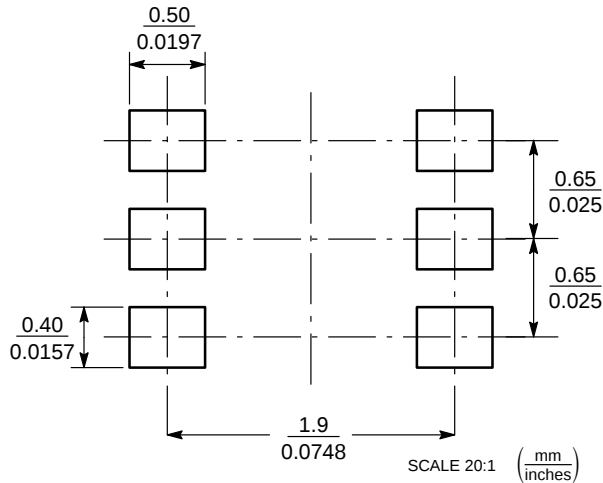


$\oplus$	0.2 (0.008)	(M)	B (M)
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DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

SOLDERING FOOTPRINT*

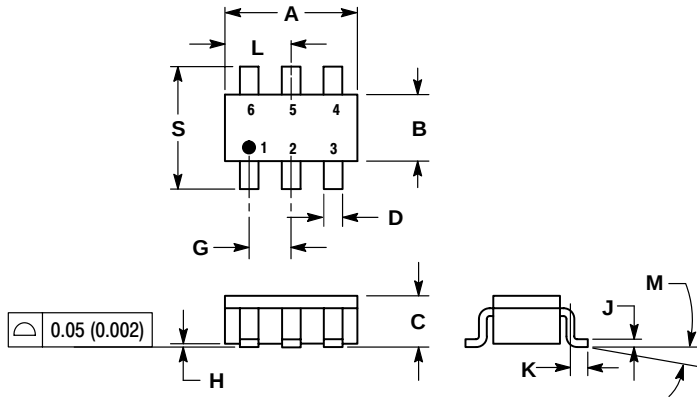


*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NL27WZ06

PACKAGE DIMENSIONS

TSOP-6
CASE 318G-02
ISSUE L

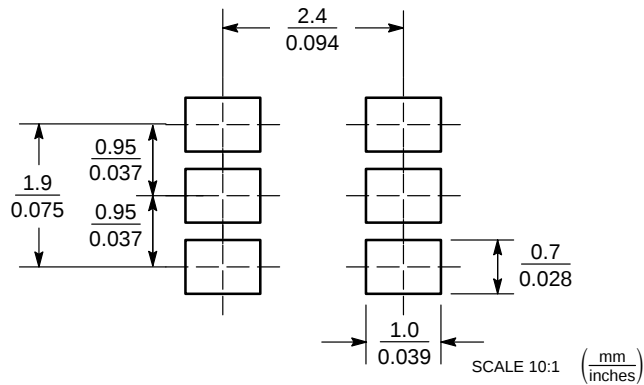


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.90	3.10	0.1142	0.1220
B	1.30	1.70	0.0512	0.0669
C	0.90	1.10	0.0354	0.0433
D	0.25	0.50	0.0098	0.0197
G	0.85	1.05	0.0335	0.0413
H	0.013	0.100	0.0005	0.0040
J	0.10	0.26	0.0040	0.0102
K	0.20	0.60	0.0079	0.0236
L	1.25	1.55	0.0493	0.0610
M	0°	10°	0°	10°
S	2.50	3.00	0.0985	0.1181

SOLDERING FOOTPRINT



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